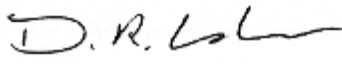




UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
Northwest Region  
7600 Sand Point Way N.E., Bldg. 1  
Seattle, WA 98115

MAY 20 2003

**MEMORANDUM FOR:** The Record

**FROM:** D. Robert Lohn   
Regional Administrator

**SUBJECT:** The Endangered Species Act (ESA) Section 7 Consultation /  
Magnuson-Stevens Act Essential Fish Habitat (EFH) Consultation:  
Puget Sound Comprehensive Chinook Management Plan: Harvest  
Management Component - ESA section 4(d) Decision /  
Determination.

**ACTION AGENCIES:** National Marine Fisheries Service (NMFS)  
Bureau of Indian Affairs (BIA)  
US Fish and Wildlife Service (USFWS)

**CONSULTATION BY:** NMFS Northwest Region (NWR)  
Sustainable Fisheries Division (SFD)

**DATE ISSUED:** May 19, 2003

**EXPIRATION DATE:** April 30, 2004

**ESA Section 7**  
**Tracking Number:** F/NWR/2003/00174

This is NMFS' ESA section 7 consultation and EFH consultation on a proposed Federal action. The proposed Federal action has four components (subactions), which the action agencies have chosen to coordinate as a package for these consultations. The primary Federal subaction is NMFS' proposed determination as to whether a resource management plan (RMP) meets the criteria in its salmon and steelhead ESA section 4(d) regulations (50 CFR 223.203) (hereafter referred to as the 4(d) Rule). Other Federal subactions evaluated in these consultations include: (1) The proposed BIA funding of Puget Sound tribes' management, enforcement, and monitoring projects in support of the 2003 RMP; (2) The proposed USFWS authorization of fisheries that are consistent with the implementation of the 2003 RMP, as approved under the 4(d) Rule; and (3) The proposed NMFS authorization of Pacific Fishery Management Council (PFMC) fisheries that are consistent with the management objectives specified in the 2003 RMP.

These consultations are based on information in the 2003 RMP, NMFS' Evaluation and Recommended Determination document, comments from reviewers, published and unpublished scientific information, and other sources of information. These documents comprise the best available scientific information regarding the effects of the proposed Federal action. A complete administrative record is on file with NMFS NWR in Seattle, Washington.



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## **ESA SECTION 7 CONSULTATION - BIOLOGICAL OPINION**

This document constitutes the NMFS biological opinion for the following four subactions proposed by the NMFS, BIA and the USFWS:

- (1) The proposed NMFS determination as to whether a RMP meets the criteria in its 4(d) Rule.
- (2) The proposed BIA funding of Puget Sound tribes' management, enforcement, and monitoring projects in support of the 2003 RMP;
- (3) The proposed USFWS authorization of fisheries that are consistent with the implementation of the 2003 RMP, as approved under the 4(d) Rule; and
- (4) The proposed NMFS authorization of PFMC fisheries that are consistent with the management objectives specified in the 2003 RMP.

NMFS is grouping these four proposed Federal subactions in this consultation pursuant to 50 CFR 402.14 (b), because they are similar actions within a given geographical area. This biological opinion has been prepared in accordance with section 7 of the ESA.

### **(A) Introduction**

On July 10, 2000, NMFS issued a 4(d) Rule establishing take prohibitions for 14 salmon and steelhead Evolutionarily Significant Units (ESUs), including the Puget Sound chinook salmon ESU (50 CFR 223.203). The 4(d) Rule provided limits on application of the take prohibitions, i.e., take prohibitions would not apply to the plans and activities set out in the rule if those plans and activities met the rule's criteria and NMFS approved the plan. One of those limits, Limit 6, applies to joint tribal and state RMPs (50 CFR 223.203(b)(6)).

On February 21, 2003, the Puget Sound Treaty Tribes and the Washington Department of Fish and Wildlife (co-managers) provided NMFS an RMP for the 2003 fishing season, May 1, 2003, through April 30, 2004. The RMP, dated February 19, 2003, is titled "Puget Sound Comprehensive Chinook Management Plan: Harvest Management Component." The 2003 RMP provides the structure through which tribal and state jurisdictions will jointly manage Puget Sound salmon fisheries and the steelhead net fisheries that may affect listed Puget Sound chinook salmon. Management objectives specified in the 2003 RMP account for fisheries-related mortality throughout the migratory range of Puget Sound chinook salmon, from Oregon to Southeast Alaska.

## **(B) Consultation History**

NMFS has considered the effects of Pacific Coast Ocean and Puget Sound salmon fisheries on listed Puget Sound chinook salmon in several other ESA section 7 consultations or 4(d) Rule determination:

- (1) A biological opinion dated April 28, 2000 titled “Effects of Pacific Coast Ocean and Puget Sound Salmon Fisheries During the 2000-2001 Annual Regulatory Cycle” was effective from May 1, 2000, through April 30, 2001.
- (2) A biological opinion titled “Endangered Species Act - Reinitiated Section 7 Consultation- Biological Opinion - Approval of the Pacific Salmon Treaty by the U.S. Department of State and Management of the Southeast Alaska Salmon Fisheries Subject to the Pacific Salmon Treaty.” This biological opinion dated November 18, 1999, is effective through December 31, 2010.
- (3) A biological opinion dated September 14, 2001 titled Programs Administered by the Bureau of Indian Affairs and Activities Authorized by the U.S. Fish and Wildlife Service Supporting Tribal Salmon Fisheries Affecting Listed Puget Sound chinook and Hood Canal summer-run chum salmon Evolutionarily Significant Units” is effective through April 30, 2003.
- (4) A 4(d) Rule determination dated April 27, 2002, titled “Joint State Tribal Resource Management Plan Provided by the Washington Department of Fish and Wildlife and the Puget Sound Tribes for Salmon Fisheries Affecting Puget Sound Chinook Salmon Under Limit 6 of the 4(d) Rule - Determination Memorandum” is effective through April 30, 2003.

The effects of Pacific Coast Ocean and Puget Sound salmon fisheries on the Snake River fall chinook, Snake River spring/summer chinook, and Snake River sockeye, Sacramento River winter chinook, Southern Oregon/Northern California Coastal coho, Central California Coastal coho, Oregon Coastal natural coho, Central Valley spring-run chinook, California coastal chinook, lower Columbia River chinook, upper Willamette River chinook, upper Columbia River spring chinook, Columbia River chum, Hood Canal summer-run chum, Ozette Lake sockeye, and ten steelhead ESUs are covered by other long-term biological opinions or 4(d) Rule determinations. These ESUs will not be discussed further in this opinion.

## **(C) Description of the Proposed Action**

The primary Federal subaction is NMFS proposes to issue a determination as to whether the 2003 RMP submitted by the co-managers meets the requirements of Limit 6 under the 4(d) Rule. NMFS is grouping three other proposed Federal subactions in this consultation pursuant to 50 CFR 402.14 (b), because they are similar actions within a given geographical area. The duration of all of the Federal subactions is through April 30, 2004, unless re-initiation is required (see Re-

initiation of Consultation section, below). The following are the four proposed Federal subactions that will be analyzed in this consultation:

(1) NMFS proposes to issue a decision that the 2003 RMP meets the requirements of Limit 6 under the 4(d) Rule. The 2003 RMP provides the framework for the co-managers to jointly manage Puget Sound salmon fisheries and steelhead net fisheries that may affect the listed Puget Sound chinook salmon ESU. To summarize the 2003 RMP, the co-managers' management plan is based on limits to the cumulative fishery-related mortality to each Puget Sound chinook salmon population or management unit. These limits are expressed as: a recovery exploitation rate; an interim escapement goal; a critical abundance threshold; and as a minimum fishery regime exploitation rate (Table 1). These management objectives form the basis of the 2003 RMP.

*Recovery Exploitation Rate:* The co-managers define exploitation rate as the total "mortality in a fishery or aggregate of fisheries expressed (for various populations and management units) as the proportion of the un-fished cohort removed by fishing" (page 67 of the 2003 RMP). The 2003 RMP's recovery exploitation rates are ceilings, not to be exceeded.

*Interim Escapement Goal:* The 2003 RMP includes interim escapement goals (sometimes referred to as the interim reference escapement goals in the 2003 RMP) for all populations or management units. The co-managers define the interim escapement goal as the "interim upper boundary" of the range of viability (page 56 of the 2003 RMP), a point where the population has a very low probability of extinction. The 2003 RMP's interim escapement goals establish the upper escapement thresholds of the co-manager's management objectives.

*Critical Abundance Threshold:* The 2003 RMP includes a critical abundance threshold for each population or management unit. The co-managers define the critical abundance threshold as a "spawning escapement level below which the co-managers will exercise maximum regulatory effect to minimize fishery-related mortalities and maximize spawning escapement" (page 67 of the 2003 RMP). The co-managers state that these thresholds are "set above the level at which a population may become demographically unstable, or at risk to loss of genetic integrity."

*Minimum Fisheries Regime Exploitation Rate:* During the pre-season process (March through April), once chinook salmon adult abundance estimates for the upcoming season are available to the co-managers for all populations of concern, the co-managers model (using the Fishery Regulation Assessment Modeling program) the Minimum Fisheries Regime outlined in Appendix C of the 2003 RMP. The resulting minimum fishery regime exploitation rate will be applied in 2003 on an individual management unit by the co-managers when the forecast abundance for any management unit is anticipated to fall below the critical abundance threshold. When imposed, the minimum fishery regime exploitation rate is a ceiling, not to be exceeded.

Table 1. The 2003 RMP's management objectives (recovery exploitation rate ceilings, interim escapement goals, critical abundance thresholds, and the range of expected exploitation rates with the implementation of minimum fishery regime), by management unit or population.

Management Unit	Population <sup>1</sup>	Recovery Exploitation Rate <sup>2</sup> (ceiling)	Interim (Reference) Escapement Goal	Critical (Low) Abundance Threshold	Range of expected exploitation rates <sup>2</sup> with the implementation of minimum fishery regime
Nooksack	North Fork Nooksack River	-	4,000	-	5% to 9% SUS
	South Fork Nooksack River	-	-	1,000 <sup>3</sup>	-
		-	-	1,000 <sup>3</sup>	-
Skagit Summer/Fall	Upper Skagit River	52%	14,900	4,800	25% to 33%
	Lower Sauk River	-	-	2,200	-
	Lower Skagit River	-	-	400	-
		-	-	900	-
Skagit Spring	Upper Sauk River	42%	3,000	576	21% to 27%
	Suiattle River	-	-	-	-
	Upper Cascade River	-	-	-	-
		-	-	-	-
Stillaguamish	North Fork Stillaguamish River	25%	2,000	650 <sup>3</sup>	12% to 16%
	South Fork Stillaguamish River	-	-	500 <sup>3</sup>	-
		-	-	-	-
Snohomish	Skykomish River	24%	5,250	2,800 <sup>3</sup>	18% to 26%
	Snoqualmie River	-	-	1,745 <sup>3</sup>	-
		-	-	521 <sup>3</sup>	-
Lake Washington		15% PT SUS	1,550	-	9% to 15% PT SUS
	Cedar River	-	1,200	200 <sup>3</sup>	-
	North Lake Washington Trib. (Bear Creek Index Area)	-	-	-	-
		-	350	-	-

Green	Green River	15% PT SUS	5,800	1,800	7% to 15% PT SUS
White River	White River	20%	1,000	200	12% to 14%
Puyallup	Puyallup River (South Prairie Creek Index Area)	50% -	- 500	500 -	36% to 46%
Nisqually	Nisqually River	-	1,100	-	- <sup>4</sup>
Skokomish	Skokomish River	15% PT SUS	3,650 <sup>5</sup>	1,300 <sup>6</sup>	11% to 15% PT SUS
Mid-Hood Canal	Hamma Hamma River Duckabush River Dosewallips River	15% PT SUS - - -	750 - - -	400 - - -	11% to 15% PT SUS - - -
Dungeness	Dungeness River	10% SUS	925	500	5% to 10% SUS
Elwha	Elwha River	10% SUS	2,900	1,000	5% to 10% SUS
Western Strait of Juan de Fuca	Hoho River	10% SUS	850	500	5% to 10% SUS

1 Populations are consistent with the populations preliminarily recognized by the Puget Sound Technical Recovery Team (TRT) within the Puget Sound chinook salmon ESU, with the exception of the Hamma Hamma and Duckabush Rivers in the Mid-Hood Canal Management Unit. The Western Strait of Juan de Fuca Management Unit is not within the Puget Sound Chinook Salmon Evolutionarily Significant Unit.

2 Exploitation rates are expressed as either total, southern United States (SUS), or pre-terminal southern United States (PT SUS).

3 All numbers are in natural-origin spawners.

4 The Nisqually Management Unit is managed to achieve a 1,100 natural spawner escapement goal.

5 Skokomish Management Unit's escapement goal of 3,650 spawners is composed of 1,650 natural-origin spawners and 2,000 hatchery-origin spawners.

6 Skokomish Management Unit's critical escapement threshold of 1,300 spawners is composed of 800 natural-origin spawners and 500 hatchery-origin spawners.

Management objectives specified in the 2003 RMP account for fisheries-related mortality throughout the migratory range of Puget Sound chinook salmon, from Oregon to Southeast Alaska. The RMP includes implementation, monitoring, and evaluation procedures designed to ensure fisheries are consistent with the 2003 RMP's management objectives. The 2003 RMP does not include the specific details of the annual fishing regime, i.e., where and when fisheries occur; what gear will be used; or how harvest is allocated among gear, areas, or fishermen. However, the 2003 RMP does provide the management objectives against which the co-managers will develop their action-specific fishing regimes to protect listed Puget Sound chinook salmon.

The co-managers, independently and jointly, conduct a variety of research and monitoring programs. Chapter 7 (starting on page 58) of the 2003 RMP describes these monitoring programs which are used to assess effectiveness of the management actions in achieving the management objectives of the RMP and to validate the assumptions used in deriving the objectives. This information will be used in conjunction with the performance indicators of the fisheries to assess the effectiveness of the 2003 RMP.

(2) The BIA proposes to fund Puget Sound tribes' management, enforcement, and monitoring projects in support of the 2003 RMP. Only the funding of projects that may impact listed Puget Sound chinook salmon through April 30, 2004, are considered in this consultation. The co-managers manage Puget Sound fisheries pursuant to the Puget Sound Salmon Management Plan (PSSMP), which establish guidelines for management of all marine and freshwater salmon fisheries in Puget Sound from the Strait of Juan de Fuca eastward. The PSSMP was adopted by court order as a sub-proceeding related *U.S. v. Washington* Civ. No. C70-9213 (W.D. Wash.), see 384 F. Supp. 312 (W.D. Wash. 1974). Puget Sound fisheries occur on all five salmon species. The BIA provides funding to the Puget Sound tribes to support the salmon fishery management programs conducted under PSSMP. Because the projects that would be funded by the BIA are those already described in the 2003 RMP, the analysis of the 2003 RMP already includes the effects of the proposed funding by the BIA.

(3) The USFWS proposes to authorize fisheries that are consistent with the implementation of the 2003 RMP, as approved under the 4(d) Rule. Only fisheries that may impact listed Puget Sound chinook salmon through April 30, 2004, are considered in this consultation. The USFWS, the State of Washington, and the treaty tribes within the Hood Canal, are parties to the Hood Canal Salmon Management Plan (HCSMP). The HCSMP is a regional management plan, which stipulates orders related to the PSSMP. All salmon species originating in Hood Canal, including listed chinook salmon, are managed under HCSMP. Any change in management objectives under the HCSMP requires the authorization by the USFWS, as a party to the plan. Because this subaction would authorize only those fisheries consistent with the 2003 RMP, the analysis of the 2003 RMP includes and fully represents effects of the USFWS action under the HCSMP.



(4) NMFS proposes to authorize PFMC fisheries that are consistent with the management objectives specified in the 2003 RMP. The PFMC salmon fisheries occur within the Exclusive Economic Zone (EEZ) off Washington, Oregon, and California. The EEZ extends up to 200 nautical miles from the coastline. The PFMC provides its annual management recommendations to the Secretary of Commerce, who implements the regulatory measures in the EEZ if they are found to be consistent with the Magnuson-Stevens Act and other applicable Federal laws. Because the Secretary of Commerce, acting through NMFS, has the ultimate authority for the implementation of the fisheries, NMFS is both the action agency and the consulting agency with respect to PFMC fisheries. Only the PFMC commercial troll and recreational hook and line salmon fisheries that may impact listed Puget Sound chinook salmon, are considered in this biological opinion. The effects of PFMC salmon fisheries on ESUs besides the Puget Sound chinook salmon ESU are covered by other long-term biological opinions or 4(d) Rule determinations.

This biological opinion considers the effects on Puget Sound chinook salmon of the PFMC fisheries for the entire May 1, 2003, through April 30, 2004 fishing season. Effective May 1, 2003, NMFS implemented management measures for ocean salmon fishing from May 1, 2003, through April 30, 2004, (68 FR 23913, May 6, 2003). On April 24, 2003, NMFS determined, under the ESA section 7(d), that the PFMC fisheries expected to occur through May 31, 2003, would not constitute an irreversible or irretrievable commitment of resources that would have the effect of foreclosing the formulation or implementation (in this biological opinion) of any reasonable and prudent alternative measures.

Each of these four subactions require consultation with NMFS because the Federal agency (NMFS, BIA, USFWS) is funding or authorizing actions that may adversely affect listed salmon (section 7(a)(2) of the ESA)

#### **(D) Action Area**

The action area for this biological opinion is comprised of two separate, but adjacent areas. The first area is as defined by the 2003 RMP, the waters of the State of Washington from the mouth of the Strait of Juan de Fuca at Cape Flattery, eastward. Fisheries within this area are under the co-managers' jurisdiction. This geographic scope encompasses the area included in the Puget Sound chinook salmon ESU, as well as the western portion of the Strait of Juan de Fuca within state waters. In addition, the action area for this biological opinion includes that portion of the EEZ off the coast of Washington, Oregon, and California that may impact listed Puget Sound chinook salmon. Fisheries within this area are under the jurisdiction of NMFS, through the PFMC process. As participants in the PFMC pre-season planning process (referred commonly as the North of Falcon), the co-managers take into consideration the impacts from both of these areas in managing for the 2003 RMP's management objectives for listed Puget Sound chinook salmon.

## **(E) Status of the Species and Critical Habitat**

### ***Species Affected:***

With respect to salmonids, impacts on only listed Puget Sound chinook salmon are addressed in this biological opinion.

On April 27, 2001, NMFS issued a Limit 6 determination under the 4(d) Rule on a RMP impacting listed Hood Canal summer-run chum salmon, limiting the application of ESA section 9 take prohibitions for those fisheries operating consistent with the RMP (66 FR 31600, June 12, 2001). That determination remains valid, and harvest activities conducted pursuant to that plan remain consistent with the requirements of the ESU.

NMFS is also the lead agency responsible for administering the Marine Mammal Protection Act of 1972 (MMPA) as it relates to certain marine mammals. The MMPA requires all commercial fisheries to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals in each fishery. Every year, NMFS reviews and revises its list of fisheries based on new information. These categories are:

- (1) Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing;
- (2) Category II designates fisheries with occasional serious injuries and mortalities; and
- (3) Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities.

For 2003, NMFS has proposed that only the Washington Puget Sound salmon drift gillnet fishery be listed as a Category II fisheries (68 FR 1414, January 10, 2003). All other Puget Sound salmon fisheries identified were Category III. No listed marine mammal species were documented to have been killed or caught and released in any salmon fishery in Puget Sound (68 FR 1414, January 10, 2003). NMFS has also proposed that the PFMC commercial troll fisheries be listed as Category III. No listed marine mammal species were documented to have been killed or caught and released in the PFMC commercial troll or the PFMC recreational hook and line fisheries. Therefore, because these fisheries are not likely to adversely affect marine mammals, effects on marine mammals will not be discussed further in this opinion.

### ***Current Status:***

For the reasons stated above, the remainder of this biological opinion will address only the effects of the proposed Federal action on only Puget Sound chinook salmon.

On March 24, 1999, NMFS listed Puget Sound chinook salmon, both naturally-produced and selected artificially propagated populations, as a threatened species (64 FR 14308, March 24, 1999). The ESU encompasses all naturally spawned populations of chinook salmon from rivers

and streams flowing into Puget Sound, including the Straits of Juan de Fuca from the Elwha River eastward, and rivers and streams flowing into Hood Canal, South Sound, North Sound, and the Strait of Georgia in Washington. NMFS also listed chinook salmon and their progeny from the following hatchery stocks because they were considered essential to the recovery of the ESU: Kendall Creek; North Fork Stillaguamish River; White River; Dungeness River; and Elwha River.

*Distribution and Trend:* The March 24, 1999 (64 FR 14308), listing determination and supporting species status reviews (NMFS 1998a; NMFS 1998b) provide relevant and recent information regarding the ESU's distribution, trend, and status. As reported by NMFS (1998b), based on the estimated total Puget Sound commercial catch extrapolated from cannery pack statistics in 1908 (when both ocean harvest and hatchery production were negligible), Bledsoe *et al.* (1989) proposed an historical abundance of 670,000 chinook salmon in this ESU. This estimate of historical Puget Sound chinook salmon population size should be viewed cautiously. The statistic on which this estimate is based, the 1908 Puget Sound cannery pack, probably included a portion of fish landed at Puget Sound ports but originating in adjacent areas. It is also likely that the cannery pack that year represents only a portion of the total catch.

Expanding upon previous NMFS and co-manager species status review work, the Puget Sound Technical Recovery Team (TRT) has completed a preliminary analysis of the population structure of chinook salmon within the Puget Sound chinook salmon ESU. The TRT is an independent scientific body convened by NMFS to develop technical delisting criteria and guidance for salmon delisting in Puget Sound. As of January 8, 2003, the TRT has identified 22 demographically independent populations representing the primary historical spawning areas of chinook salmon (M. Ruckelshaus, chair, Puget Sound TRT, pers. com., with K. Schultz, NMFS, January 8, 2003; NMFS 2002a).

Escapement estimates from 1998 (the time of the last NMFS status review for this species) through 2001 (2002 escapement results were not provided in the 2003 RMP) indicate that between 26,397 and 48,807 natural chinook salmon have escaped to spawn in the ESU (see Table 5 in the Evaluation and Recommended Determination). All but one population (Dosewallips River) are showing an increasing escapement trend during this five-year period. Though the short-term escapement trends are generally positive, many of these populations are influenced by hatchery production, which may mask the status and trends of naturally spawning fish. Details on the status of the populations and the Puget Sound chinook salmon ESU are provided in the 2003 RMP and the associated NMFS' Evaluation and Recommended Determination.

## **(F) Environmental Baseline**

Environmental baselines for biological opinions are defined by regulation at 50 CFR 402.02, which states that an environmental baseline is the physical result of all past and present state, Federal, and private activities in the action area along with the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early ESA section 7 consultation. The environmental baseline for this biological opinion is therefore the

result of the impacts that many activities (summarized below) have had on Puget Sound chinook salmon likelihood of survival and recovery.

In general, a wide variety of factors have contributed to the decline of chinook salmon populations in the Puget Sound area. In some cases, activities identified at the time of listing as factors for decline have received increasing attention, and their effects are being reduced. However, the most pervasive risks to improved status of listed salmon require long and difficult effort to correct, and many actions geared towards reducing likelihood of extinction still require relatively long periods of time for their positive effects to become noticeable.

*Human-Induced Habitat Degradation:* Although some types of gear used in the marine environment, such as bottom trawls, are known to have habitat impacts, these gears are not used in the salmon fisheries considered here. Bishop and Morgan (1996), identified a variety of habitat issues for streams in the range of this ESU resulting from urbanization, forest, and agricultural practices including (1) changes in flow regime (all basins), (2) sedimentation (all basins), (3) high temperatures (Dungeness, Elwha, Green/Duwamish, Skagit, Snohomish, and Stillaguamish Rivers), (4) streambed instability (most basins), (5) estuarine loss (most basins), (6) loss of large woody debris (Elwha, Snohomish, and White Rivers), (7) loss of pool habitat (Nooksack, Snohomish, and Stillaguamish Rivers), and (8) blockage or passage problems associated with dams or other structures (Cedar, Elwha, Green/Duwamish, Snohomish, and White Rivers). Further, aquaculture practices have played a role in degrading riverine and estuarine habitats. These activities and habitat modifications have greatly degraded extensive areas of salmon spawning and rearing habitat in the Puget Sound.

NMFS has not yet analyzed what role that habitat degradation has played in contributing to the decline of Puget Sound salmon, and how recovery of the ESU might benefit from any proposed protective or restoration strategies. Specifically, NMFS is unable at this time to quantify improvements in productivity that should result from improvements in habitat conditions. It is reasonable to expect, however, that improvements in land management on state, Federal, and private land within the Puget Sound will result in improved overall survivals for listed chinook salmon considered in this biological opinion.

*Hatcheries:* Fall-, summer-, and spring-run chinook salmon stocks are artificially propagated through 42 programs in Puget Sound. Currently, the majority of chinook salmon hatchery programs (34 programs) produce fall-run (also called summer/fall) stocks for the purpose of enhancing fisheries. Captive broodstock and supplementation programs implemented as conservation measures to recover spring-run chinook salmon operate in the White River (Appleby and Keown 1994) and the Dungeness River watersheds (Smith and Sele 1995). Conservation-directed supplementation programs currently exist for spring-run chinook salmon on North Fork Nooksack River and for summer-run chinook salmon on the North Fork Stillaguamish and Elwha Rivers (Fuss and Ashbrook 1995; Marshall *et al.* 1995).

Hatchery fish also pose potential risk to naturally-produced salmon and steelhead in four primary ways: (1) ecological effects, (2) genetic effects, (3) harvest effects, and (4) masking effects (NMFS 2000c). Ecologically, hatchery fish can prey upon, displace, and compete with wild fish

for food and rearing space as juveniles. These risks to natural-origin fish may be highest in freshwater areas after the hatchery-origin juvenile fish are released. The risk of effects on the natural-origin fish likely diminish as the hatchery fish disperse seaward downstream. If carrying fish disease pathogens, released hatchery fish may transmit those pathogens to natural-origin fish when the fish intermingle in natural areas. If present in the hatchery, fish disease pathogens may also be transmitted to natural-origin fish rearing downstream of hatcheries in hatchery effluent. Hatchery fish can potentially affect the genetic composition of native fish that are genetically dissimilar by interbreeding with them.

There is currently a shift occurring in hatchery management from augmenting harvest to restoring, maintaining and conserving natural populations of anadromous salmonids (NMFS 2002b). Within the last decade, hatchery programs have responded to ESA listings and the continuing declines in natural populations by shifting to conservation programs (Flagg and Nash 1999). The goals of conservation programs are to restore and maintain natural populations. The change to conservation-type hatchery programs has followed a general call for hatchery reform within the Pacific Northwest. The changes proposed are to ensure that existing natural salmonid populations are preserved, and that hatchery-induced genetic and ecological effects to natural populations are minimized.

Hatchery programs in the Pacific Northwest are in the process of phasing out use of improper broodstocks, such as out-of-basin or out-of-ESU stocks, replacing them with fish derived from, or more compatible with, locally adapted populations. Producing fish that are better suited for survival in the wild is now an explicit objective of many salmon hatchery programs. Hatchery programs are also incorporating improved production techniques, such as NATURES-type rearing protocols and limits on the duration of conservation hatchery programs.

*Harvest:* In the past, fisheries in Puget Sound were not managed in a manner appropriate for the conservation of naturally spawning chinook salmon populations. Fisheries exploitation rates were too high in light of the declining productivity of natural chinook salmon stocks. Additionally, high exploitation rates directed at hatchery stocks have caused many natural stocks to fail to meet natural escapement goals in some years.

The co-managers implemented several strategies to manage fisheries to reduce harvest impacts in recent years and to implement harvest objectives that are consistent with the underlying production of the natural population. Time and area closures are implemented to reduce catches of weak stocks and to reduce chinook by-catch in other fisheries. Other regulations, such as size limits, bag limits, and requirements for the use of barbless hooks in all recreational fisheries are also used.

*Natural Conditions:* The declines in fish populations in Puget Sound in the 1980s and into the 1990s may reflect broad-scale shifts in natural limiting conditions, such as increased predator abundances and decreased food resources in ocean rearing areas. NMFS has noted that predation

by marine mammals has increased as marine mammal numbers, especially harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) increase on the Pacific Coast (NMFS 1998a). In addition to predation by marine mammals, Fresh (1997) reported that 33 fish species and 13 bird species are predators of juvenile and adult salmon, particularly during freshwater rearing and migration stages.

Changes in climate and ocean conditions happen on several different time scales and have had a profound influence on distributions and abundances of marine and anadromous fishes. Recent evidence suggests that marine survival among salmonids fluctuates in response to 20- to 30-year cycles of climatic conditions and ocean productivity. Although recent climatic conditions appear to be within the range of historical conditions, the risks associated with climatic changes are probably exacerbated by human activities (Lawson 1993).

*Scientific Research:* Puget Sound chinook salmon, like other ESA-listed fish, are the subject of scientific research and monitoring activities. Most biological opinions issued by NMFS have conditions requiring specific monitoring, evaluation, and research projects to gather information to aid the preservation and recovery of listed fish.

The impacts of these research activities pose both benefits and risks to the listed species. In the short-term, a limited number of fish are harassed and even killed in the course of scientific research; however, these activities have a great potential to benefit to ESA-listed species in the long-term. Most importantly, the information gained during research and monitoring activities will assist in planning for the recovery of listed species.

### **(G) Effects of the Proposed Action**

In its biological opinions, NMFS analyzes the effects of the proposed Federal action, as defined in 50 CFR 402.02, to determine whether the proposed Federal action are likely to jeopardize the continued existence of the affected listed ESUs or result in the destruction or adverse modification of designated critical habitat. NMFS considers the estimated level of injury or mortality attributable to the collective effects of the action and any cumulative effects and then determines the impact on species abundance and distribution. NMFS also evaluates whether the action directly or indirectly is likely to destroy or adversely modify the listed species' designated critical habitat.

Estimated impacts from the fisheries authorized by the proposed Federal subactions vary by stock, consistent with stock-specific management objectives specified in the 2003 RMP. Through the pre-season PFMC process (North of Falcon), various fishery harvest regimes are evaluated by a fishery model (Fishery Regulation Assessment Modeling or FRAM) for impacts to listed Puget Sound populations. The Puget Sound and the PFMC fisheries are considered in concert during this pre-season planning process to develop the various harvest regime model inputs.

The resulting output of the pre-season FRAM model runs are examined by the co-managers for compliance with the 2003 RMP's management objectives by management unit (see Table 1). As required by the 2003 RMP, the anticipated exploitation rates must not exceed the 2003 RMP's recovery exploitation rate ceilings. Additionally, each management unit's expected escapement must be greater than the 2003 RMP's low abundance threshold *or* the projected exploitation rate is less than the 2003 RMP's low abundance exploitation rate ceiling, as determined by the application of Appendix C of the 2003 RMP.

For the 2003 fishing season, FRAM model run 1603 (dated April 9, 2003) is the final product of this pre-season PFMC planning process. Anticipated exploitation rates for the PFMC southern U.S. (SUS), non-PFMC SUS, and the combined Canadian and Alaska fisheries, along with the projected natural escapement of Puget Sound chinook salmon by management unit are depicted in Table 2. Initial regulations enacted for the 2003 fishing season will implement the harvest regime used to produce FRAM model run 1603. Regulations for the Puget Sound salmon fisheries may be modified in-season by the co-managers based on abundance, timing, and fishery monitoring information. Any modification to the regulations in-season must be consistent with the management objectives in the 2003 RMP.

Table 2. Anticipated 2003 exploitation rates for PFMC southern U.S. (SUS), non-PFMC SUS, and Canadian and Alaska combined. Projected natural escapement of Puget Sound chinook salmon by management unit are also provided, 2003. Estimated are based on the preliminary pre-season FRAM model run 1603.

Management Unit	(A) PFMC SUS Exploitation Rate	(B) Non-PFMC SUS Exploitation Rate	(A) + (B) SUS Exploitation Rate	(C) Canadian and Alaska Exploitations Rate	(A) + (B) + (C) Total Exploitation Rate	Projected Natural Spawning Escapement
Nooksack	1%	6%	7%	13%	20%	399
Skagit Sum/Fall	0%	9%	18%	32%	50%	11,634
Skagit Spring	2%	13%	15%	9%	24%	1,136
Stillaguamish	1%	12%	13%	5%	18%	2,322
Snohomish	3%	12%	15%	6%	21%	5,073
Lake Wash. (Cedar River)	4%	17%	21%	10%	31%	307
Green	4%	36%	40%	11%	51%	7,534
White River	1%	17%	18%	1%	19%	1,507
Puyallup	4%	35%	39%	11%	50%	2,392
Nisqually	6%	63%	69%	8%	77%	1,106
Skokomish	3%	43%	46%	14%	60%	1,347
Mid-Hood Canal	3%	12%	15%	14%	29%	531
Dungeness	0%	5%	5%	18%	23%	352
Elwha	0%	5%	5%	18%	23%	2,125



NMFS' evaluation of the effects of the 2003 RMP is described in more detail in its associated Evaluation and Recommended Determination document. In the Evaluation and Recommended Determination, NMFS evaluated the anticipated results of the implementation of 2003 RMP against either (1) NMFS' or the Viable Salmonid Populations (VSP) paper's guidance for critical and viable threshold standards, and (2) NMFS' rebuilding exploitation rate ceiling standards.

NMFS has used these same standards in previous consultations and determinations to assess whether fishing under the co-managers' regulations would reduce the likelihood of survival and recovery of the Puget Sound chinook salmon ESU (NMFS 1999, 2000a, 2001a). However, some caution is warranted since NMFS' rebuilding exploitation rates have yet to be derived for several populations in the ESU for which data is available. These rates should be completed for use by NMFS, along with any additional results forwarded by the TRT, to evaluate future management plans.

At this time it would be useful to describe the process NMFS used in deriving the rebuilding exploitation rates. There are four steps involved with determining population specific rebuilding exploitation rates: (1) identify populations; (2) set threshold abundance levels; (3) estimate population productivity as indicated by a spawner-recruit relationship; and (4) identify through simulation the appropriate rebuilding exploitation rate. A brief discussion of these four steps follows. A more detail description of the process is available in a previous biological opinion (NMFS 1999).

(1) *Identify Population* - Section (b)(4)(i)(A) of the Evaluation and Recommended Determination document (starting on page 10) discusses in more detail the Puget Sound chinook salmon populations as currently recognized by the TRT. The TRT reviewed several sources of information in deriving the preliminarily recognized delineations. These sources of information include geography, migration rates, genetic attributes, patterns of life history and phenotypic characteristics, population dynamics, environmental and habitat characteristics (NMFS 2001b). For populations within the ESU, as of January 8, 2003, the TRT has narrowed the earlier population delineation offered by the Salmon and Steelhead Stock Inventory and Assessment to 22 demographically independent populations representing the primary historical spawning areas of chinook salmon (see Table 3 of the Evaluation and Recommended Determination).

(2) *Threshold Abundance Levels* - The critical threshold was developed from a consideration of genetic, demographic, and spatial risk factors for each population. Genetic risks to small populations include the loss of genetic variation, inbreeding depression, and the accumulation of deleterious mutations. The risk posed to a population by genetic factors is often expressed relative to the effective population size, or the size of an idealized population that would produce the same level of inbreeding or genetic drift that is seen in an observed population. Factors associated with demographic risks include environmental variability and depensation. Depensation, or a decline in the productivity of a population (e.g., smolts per spawner) as the abundance declines, can result from the uncertainty of finding a mate in a sparse population

and/or increased predation rates at low abundance.

Demographic risks were assessed using both the Dennis model (Dennis *et al.* 1991 as cited in NMFS 1999) and a Ricker stock-recruit model. The Dennis model can be used to provide an estimate of the number of spawners required to have a desired level of probability that the population does not go extinct within a defined period of time. For this analysis, NMFS estimated the population size that would be required to have a 95 percent probability that the population would not go extinct within 10 years. Critical threshold was also derived from an analysis of the Ricker stock-recruit relation. Peterman (1977, 1987) provided a rationale for depensation and suggested relating the escapement level at which depensation occurs to the size of the population in the absence of fishing (equilibrium escapement level). NMFS set this measure of the critical threshold equal to five percent of the equilibrium escapement level. Both of these measures of the critical threshold was considered in the context of the types and quality of data available, the characteristics of the watershed, and the biology of the population. A similar method was used to establish the viable population. A viable population was considered the level of escapement required to achieve the maximum sustainable yield (demographics). The larger of the two models was selected for use as the viable population threshold.

(3) *Estimate Population Productivity as Indicated by a Spawner-Recruit Relationship* - The third step in the process of identifying population specific rebuilding exploitation rates is to estimate the stock-recruit parameters. Estimates of the Ricker stock-recruit parameters for each population were required for both establishing the escapement threshold levels and for the simulations of population dynamics. These parameters were estimated using methods developed by the Chinook Technical Committee (Chinook Technical Committee, in press as cited in NMFS 1999).

(4) *Identify Through Simulation the Appropriate Rebuilding Exploitation Rate* - The final step in determining rebuilding exploitation rates is to use a simulation model to iteratively solve for an exploitation rate that meets specific criteria that are related to both survival and recovery given the specified thresholds and estimated spawner/recruit parameters. The consultation regulations define "jeopardize the continued existence" to mean: "... to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing appreciably the reproduction, numbers, or distribution of the species" (50 CFR section 402.2).

The simulation then uses this definition - "... reduce appreciably the likelihood of survival and recovery ..." - and the population specific threshold levels to identify an exploitation rate that meets the following criteria:

- (a) Did the percentage of escapements less than the critical threshold value increase by less than five percentage points relative to the baseline? *and, either*

- (b) Does the escapement at the end of the 25 year simulation exceed the viable threshold at least 80% of the time? *or*
- (c) Does the percentage of escapements less than the recovery level at the end of the 25 year simulation differ from the baseline by less than 10 percentage point?

The baseline condition used for comparison in this context assumes zero harvest everywhere. Said another way, these criteria seek to identify an exploitation rate that will not appreciably increase the number of times a population will fall below the critical threshold and also not appreciably reduce the prospects of achieving recovery. The rebuilding exploitation rate is the highest exploitation rate that can meet criterion (a) *and* criterion (b) *or* (c). Once identified, proposed fisheries can be evaluated by considering the likelihood that they will meet the rebuilding exploitation rates.

Rebuilding exploitation rates have not been derived for all populations within the ESU. In populations where rebuilding exploitation rates were not identified, NMFS used guidance from the VSP paper (NMFS 2000b). The VSP paper provides several rules of thumb, which are intended to serve as guidelines for setting population specific thresholds. The VSP paper develops the idea of threshold abundance levels as one of several indicators of population status (others being productivity, spatial structure, and diversity). The thresholds described include a critical threshold and a viable population abundance level. The critical threshold generally represents a boundary below which uncertainties about population dynamics increase and therefore extinction risk increases substantially. Guidance from the existing VSP paper suggests that effective population sizes of less than 500-5,000 per generation are at increased risk. The population size range per generation was converted to an annual spawner abundance range of 125-1,250 by dividing by four, the approximate generation length. The viable population threshold is a higher abundance level that would generally indicate recovery or a point beyond which ESA type protections are no longer required with the caveat that abundance is not the only relevant or necessary indicator of recovery.

A summary of the evaluation of the likelihood that the implementation of the 2003 RMP's individual management objectives will meet the NMFS' or the VSP standards follows. However, it is important to emphasize that the analysis is made with respect to individual populations, while the jeopardy determination is made with respect to the anticipated impacts to the ESU. For example, the failure to meet the standards for a few populations in a large ESU does not necessarily indicate jeopardy to the ESU as a whole.

#### (1) Critical and Viable Threshold Comparison:

NMFS has completed a comprehensive analysis for a subset of Puget Sound chinook salmon populations and derived critical and viable population thresholds for those populations (Table 3). For populations without NMFS' derived critical and viable population thresholds, guidance from

the VSP paper was used to evaluate the 2003 RMP. Section (b)(4)(i)(B) of the Evaluation and Recommended Determination (starting on page 15) provides this comparison of the 2003 RMP's critical abundance threshold and interim escapement goal management objectives to the NMFS' derived critical and viable thresholds or the VSP paper's guidance. With the exception of the Dosewallips River (discussed below), the 2003 RMP's critical abundance thresholds are consistent with NMFS' critical threshold standards.

Table 3. Critical and viable escapement thresholds associated with NMFS' rebuilding exploitation rates.

Management Unit	Population	Escapement Thresholds		Rebuilding Exploitation Rates	
		Critical	Viable	Coded-Wire Tag	Fishery Regulation Assessment Modeling (FRAM)
<b>Nooksack</b>	North Fork Nooksack River	200	1,250	24%	17%
	South Fork Nooksack River	200	1,250	30%	21%
<b>Skagit Summer/Fall</b>	Upper Skagit River	967	7,454	54%	60%
	Lower Skagit River	251	2,182	33%	49%
	Lower Sauk River	200	681	36%	51%
<b>Stillaguamish</b>	North Fork Stillaguamish River	300	552	45%	32%
	South Fork Stillaguamish River	200	300	28%	24%
<b>Snohomish</b>	Skykomish River	1,650	3,500	24%	24%
	Snoqualmie River	300	-	-	-
<b>Green</b>	Green River	835	5,523	62%	53%

*Dosewallips River:* Based on the preliminary 2003 forecast, past performance of the fishery under similar conditions, current status of the population, it is expected that the 2003 return into the Dosewallips River will continue to be below the VSP spawner abundance range guidance for a population. The escapement trend in the Dosewallips River has been declining over the four-year period reviewed (see Table 5 of the Evaluation and Recommended Determination). Additional risk to the Dosewallips River population within the Mid-Hood Canal Management Unit may be expected in 2003, in part, due to the lack of an individual critical abundance threshold for the Dosewallips River population, to provide management guidance. The recent four-year average escapement of 47 into this system represents 0.13 percent of the recent five-

year combined average escapement of 36,939 into the entire ESU, as depicted in Table 5 of the Evaluation and Recommended Determination.

The Dosewallips River population is within the Mid-Hood Canal Management Unit. The characteristics of this population, including life history and run timing, are represented by the other population in the Hood Canal region and by other populations within the ESU. Additionally, the role of the undefined spawning aggregations in the adjacent Hamma Hamma and the Duckabush Rivers in recovery and their relationship with the Dosewallips River population may be clarified as further information becomes available. Because it is possible that production in the Hamma Hamma and the Duckabush Rivers may contribute to the stability of the Dosewallips River population, NMFS' assessment of the impacts of the 2003 RMP on the Dosewallips should be considered conservative.

## (2) Exploitation Rate Comparison:

Management objectives specified in the 2003 RMP account for fisheries-related mortality throughout the migratory range of Puget Sound chinook salmon, from Oregon to Southeast Alaska. In some cases, the individual management objectives in the 2003 RMP do not include exploitation rates occurring in the terminal fisheries (see Table 1). However, in all cases, NMFS evaluated the 2003 RMP based on the anticipated total exploitation rate in 2003.

As mention earlier, NMFS has completed comprehensive analyses for a subset of Puget Sound chinook salmon populations and derived critical and viable thresholds for several populations. These thresholds were also used by NMFS to calculate rebuilding exploitation rates for these populations (see Table 3). NMFS' rebuilding exploitation rates are considered total exploitation rate ceilings for that population. For individual populations, exploitation rates at or below the NMFS' rebuilding exploitation rates will not appreciably reduce the likelihood of survival and recovery of that population, under current environmental conditions. NMFS' rebuilding exploitation rates were calculated from direct measures of fishing-related mortality (coded-wire tags), which were translated into FRAM modeled exploitation rates. FRAM exploitation rates can more easily be compared with output from fishing models currently used by the co-managers to evaluate harvest regimes.

All NMFS' rebuilding exploitation rates are for individual populations (see Table 3). The 2003 RMP's recovery exploitation rates are for management units, which may include multiple populations (see Table 1). With the exception of the lower Skagit River and the North Fork Nooksack River populations (discussed below), the anticipated 2003 exploitation rates are below NMFS' corresponding rebuilding exploitation rates. Section (b)(4)(i)(C) of the Evaluation and Recommended Determination (starting on page 32) provides additional details on the comparison of the 2003 RMP's recovery exploitation rates with NMFS' rebuilding exploitation rates. The preliminary pre-season FRAM model run 1603 supports NMFS' assessment that the 2003 exploitation rates under the 2003 RMP will be at or below NMFS' rebuilding exploitation

rate ceilings for most of these populations.

*Lower Skagit River:* The preliminary pre-season FRAM model runs suggest that the total exploitation rate in 2003 on the Skagit River Summer/Fall Management Unit will be approximately 50 percent, 1 percentage point above the NMFS' rebuilding exploitation rate ceilings of 49 percent for the lower Skagit River population. The difference between these two ceilings is very small. Under the 2001 RMP, the lower Skagit River population has exhibited an increasing escapement trend (see Table 6 of the Evaluation and Recommended Determination). The population's classification is considered to be above the lower threshold but below the upper threshold. The recent five-year average escapement is near the upper threshold (see Table 5 of the Evaluation and Recommended Determination). The Skagit River is located in the north Puget Sound region. The characteristics of this population, including life history and run timing, are represented by other populations in the region and by other populations within the ESU.

The management objectives of the 2003 RMP are very similar to the management objectives in the 2001 RMP. In 2001, the escapement into the Skagit River for the summer/fall populations exceeded the lower thresholds for all populations, and exceeded the upper threshold for both the upper Skagit River and the lower Skagit River populations (see Table 5 in the Evaluation and Recommended Determination). The preliminary forecast of the summer/fall return to the Skagit River in 2003 of 13,700 (NMFS 2003a) is above the 2003 RMP's critical abundance level, and consistent with the pre-season forecast in 2002 of 13,766, and above the pre-season forecast in 2001 of 9,290 (WDFW 2003).

*North Fork Nooksack River:* Additional risk to the North Fork Nooksack River population may be expected in 2003, under the 2003 RMP, primarily due to the anticipated total exploitation rate, in which the Canadian fisheries will account for the majority of the exploitation, exceeding NMFS' rebuilding exploitation rate ceiling for this population. The exploitation rate in 2003 is expected to exceed NMFS' rebuilding exploitation rate ceiling for this population by three percentage points (see Table 15 of the Evaluation and Recommended Determination). The population's classification is considered to be below the lower threshold, but has shown an increasing trend in escapement (see Table 6 of the Evaluation and Recommended Determination).

There are two populations within the Nooksack Management Unit: the North Fork Nooksack River and the South Fork Nooksack River populations. Both populations are classified as Category 1 populations (see Table 4 of the Evaluation and Recommended Determination). The number of reported strays between the South Fork and North Fork Nooksack River populations is fairly large (see page 18 of NMFS 2001b). However, it is difficult at this time to discern whether the fish moving between the forks are expected to influence one another's population or extinction dynamics. Length-at-age of fish from the two streams is not significantly different. Additionally, Kendall Creek hatchery (North Fork Nooksack River) stocks are also listed under the ESA. Production from the Kendall Creek hatchery contributes extensively to the abundance

and return of the North Fork Nooksack River population. The 1997 to 2001 five-year average spawning escapement into the North Fork Nooksack River is 680 when hatchery-origin production is considered (Table 1, page 94 in Appendix A of the 2003 RMP). This is compared to the five-year average natural-origin spawning escapement of 132 mentioned earlier. This hatchery-origin production adds some additional buffer to the risks to this population in the short term.

All 2003 U.S. fishery-related mortality on the North Fork Nooksack River population will be incidental, taken in fisheries targeting other healthy populations or species. Given the anticipated Canadian exploitation rate, essentially the entire southern United States exploitation rate on the North Fork Nooksack River population would have to be eliminated (i.e., to less than 4 percent), to achieve the NMFS' rebuilding exploitation rate ceiling of 17 percent for this population. Based on the preliminary pre-season FRAM model run 1603 (dated April 9, 2003), seventy-four percent of the SUS fishery-related mortality to the Nooksack River populations in 2003 is anticipated to occur in treaty Indian fisheries. NMFS, as a matter of policy, based primarily on treaty obligations, has sought not to entirely eliminate harvest, instead accepting potential, slight increased risk to the species to provide limited fishery opportunity (NMFS 2002c). This approach is particularly important to the tribes, recognizes their treaty rights and NMFS' trust responsibility.

No critical habitat is designated for the Puget Sound chinook salmon ESU. Therefore, the proposed Federal action will not directly or indirectly destroy or adversely modify this ESU's critical habitat. However, in the absence of designated critical habitat for Puget Sound chinook salmon, it is still pertinent to evaluate the effects of the proposed action on the listed species' habitat to determine whether those actions are likely to jeopardize the species' continued existence. As described in the attached NMFS' Magnuson-Stevens Fishery Conservation and Management Act essential fish habitat consultation, fisheries consistent with the 2003 RMP would have a negligible impact on the physical environment. The anticipated impacts on water quality from the implementation of the resource management plan are also expected to be negligible.

## **H) Cumulative Effects**

Cumulative effects are those effects defined in 50 CFR 402. Cumulative effects include the effects of future state, tribal, local or private actions not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to this consultation. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. Non-Federal actions that require authorization under other sections of the ESA, and not included here, will be considered in separate section 7 consultations. Non-Federal actions such as actions taken by state, tribal and local governments will likely to be in the form of legislation, administrative rules or policy initiatives. Government and private actions may include changes in land and

water uses, including ownership and intensity, any of which could impact listed species or their habitat. Government actions are subject to political, legislative and fiscal uncertainties. These realities, added to the geographic scope of the action area which encompasses numerous government entities exercising various authorities and the many private landholdings, make any analysis of cumulative effects difficult and speculative.

*Representative State Actions* - The Washington state government is cooperating with other governments to increase environmental protection for listed ESUs, including developing and applying better habitat restoration, hatchery and harvest reforms, and water resource management. The following list of major efforts and programs, described in the Summer Chum Salmon Conservation Initiative (WDFW and PNPTC 2000) are directed at or are contributing to the recovery of Puget Sound chinook salmon:

- Washington Wildlife and Recreation Program
- Wild Stock Restoration Initiative
- Joint Wild Salmonid Policy
- 1994 - Hood Canal Coordinating Council
- Governor's Salmon Recovery Office
- Conservation Commission
- Salmon Recovery Lead Entities
- Salmon Recovery Funding Board
- Forest and Fish Report
- Growth Management Act

There are other proposals, rules, policies, initiatives, and government processes that help conserve marine resources in the Puget Sound, improve the habitat of listed species, and assist in recovery planning. As with the above state initiatives, these programs could benefit the listed species if implemented and sustained.

In the past, Washington State's economy was heavily dependent on natural resources, with intense resource extraction activity. Changes have occurred in the last decade and are likely to continue with less large scale resource extraction, more targeted extraction methods, and substantial growth in other economic sectors. Growth in new businesses is creating urbanization pressures and has contributed to population growth and movement in the Puget Sound area, a trend likely to continue for the next few decades. Such trends will place greater demands in the action area for electricity, water and buildable land; will affect water quality directly and indirectly; and will increase the need for transportation, communication and other infrastructure development. These impacts will affect habitat features, such as water quality and quantity, which are important to the survival and recovery of the listed species. The overall effect is likely to be negative, unless carefully planned for and mitigated through the initiatives and measures described above.



*Local Actions:* Local governments will be faced with similar but more direct pressures from population increases and attendant activities. There will be demands for intensified development in rural areas as well as increased demands for water, municipal infrastructure and other resources. The reaction of local governments to such pressures is difficult to assess at this time without certainty in policy and funding. In the past local governments in the action area generally accommodated additional growth in ways that adversely affected listed fish habitat, allowing for development to destroy wetlands, stream-banks, estuarine shorelines, and other areas critical to listed species.

Some local government programs, if submitted for consideration, may qualify for a limit under the NMFS' ESA section 4(d) rule, which is designed to conserve listed species. Local governments also may participate in regional watershed health programs, although political will and funding will determine participation and therefore the effect of such actions on listed species. Overall, without comprehensive and cohesive beneficial programs and the sustained application of such programs, it is likely that local actions will have few measurable positive effects on listed species and their habitat, and may even contribute to further degradation.

*Tribal Actions:* Tribal governments participate in cooperative efforts involving watershed and basin planning designed to improve fish habitat and are expected to continue to do so. The results from changes in tribal forest and agriculture practices, water resource allocations, and land uses are difficult to assess for the same reasons discussed under State and Local Actions. The earlier discussions related to growth impacts apply also to tribal government actions. Tribal governments will need to apply comprehensive and beneficial natural resource programs to areas under their jurisdiction to produce measurable positive effects for listed species and their habitat.

*Private Actions:* The effects of private actions on ESA-listed resources are the most uncertain. Private landowners may convert current use of their lands, or they may intensify or diminish current uses. Individual landowners may voluntarily initiate actions to improve environmental conditions, or they may abandon or resist any improvement efforts. Their actions may be compelled by new laws, or may result from growth and economic pressures. Changes in ownership patterns will have unknown impacts.

*Summary:* Non-federal actions on listed species are likely to continue affecting listed species. The cumulative effects in the action area are difficult to analyze considering the geographic landscape of this opinion, the uncertainties associated with government and private actions, and the changing economies of the region. Whether these effects will increase or decrease is a matter of speculation; however, based on the trends identified in this section, the adverse cumulative effects are likely to increase. Although Tribal, state, and local governments have developed plans and initiatives to benefit listed fish, they must be applied and sustained in a comprehensive way before NMFS can consider them "reasonably foreseeable" in its analysis of cumulative effects.

## **(I) Conclusion**

The 2003 RMP's management objectives incorporate, and are consistent with, the best available scientific information on the population structure of the Puget Sound chinook salmon ESU. As discussed in previous sections of this biological opinion and in more detail in the Evaluation and Recommended Determination, NMFS analysis on the implementation of the 2003 RMP identifies the likelihood that 19 of the 22 populations within the ESU will meet NMFS' or the VSP paper's guidance standards. NMFS analysis on the implementation of the 2003 RMP also identifies likelihood that three populations (Dosewallips River, the lower Skagit River, and the Nooksack River) will not meet NMFS' or the VSP paper's guidance standards.

*Dosewallips River* - Based on considerations discussed above and in the Evaluation and Recommended Determination, the potential higher risk that this population may be expected to experience in 2003, in this one-year harvest management plan, will not appreciably reduce the likelihood of the ESU's survival and recovery. These considerations include that this population represents 0.13 percent of the recent five-year combined average escapement, characteristics of this population, including life history and run timing, are represented by the other population in the Hood Canal region and by other populations within the ESU, and the role of the undefined spawning aggregations in the adjacent Hamma Hamma and the Duckabush Rivers in recovery.

*Lower Skagit River* - Based on considerations discussed above and in the Evaluation and Recommended Determination, the anticipated exploitation rate in 2003 on the lower Skagit River within the Skagit Summer/Fall Management Unit will not appreciably reduce the likelihood of the ESU's survival and recovery. These considerations include the past performances of the fisheries under similar conditions, the current status of the populations, and the preliminary 2003 return information.

*North Fork Nooksack River* - As mentioned previously, NMFS as a matter of policy, based primarily on treaty obligations, has sought not to entirely eliminate harvest, instead accepting potential, slight increased risk to the species to provide limited fishery opportunity (NMFS 2002c). The treaty tribes have a right and priority to conduct their fisheries within the limits of conservation constraints. Because of the Federal government's trust responsibility to the tribes, NMFS is committed to considering the co-managers' judgment and expertise when it comes to the conservation of trust resources. However, the opinion of the co-managers and their immediate interest in fishing is balanced against NMFS responsibilities under ESA. Based on these considerations, NMFS concludes that the 2003 RMP Nooksack Management Unit's minimum fishery regime exploitation rate that would be imposed on the southern United States fisheries in 2003, in this one-year 2003 RMP, achieves this balance.

Overall, the management objectives in the 2003 RMP are protective of the geographic, life

history, and diversity of the ESU. Therefore, the potential higher risk that the Dosewallips River, the lower Skagit River, and the Nooksack River populations may be expected to experience in 2003 will not appreciably reduce the likelihood of the ESU's survival and recovery in this one-year harvest management plan. After reviewing the current status of the listed ESU considered in this biological opinion, the environmental baseline for the action area, the effects of the proposed Federal action, and the cumulative effects, it is NMFS' biological opinion that the implementation of the 2003 RMP will not appreciably reduce the Puget Sound chinook salmon ESU likelihood of survival and recovery by reducing appreciably the reproduction, numbers, or distribution of the species.

No critical habitat is designated for the Puget Sound chinook salmon ESU. Therefore, the proposed Federal action will not directly or indirectly destroy or adversely modify this ESU's critical habitat.

### **INCIDENTAL TAKE STATEMENT**

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Pursuant to the 4(d) Rule, the ESA section 9 take prohibitions do not apply to harvest activities which are consistent with the "Puget Sound Comprehensive Chinook Management Plan: Harvest Management Component." Therefore, the federal subactions associated with the fishery harvest activities described in the 2003 RMP and the Evaluation and Recommended Determination are not be subject to ESA section 9 take prohibitions.

Under the terms of section 7(b)(4) and section 7(o)(2), take that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement. Although management objectives specified in the 2003 RMP account for fisheries-related mortality throughout the migratory range of Puget Sound chinook salmon, the PFMC fisheries are not described in the 2003 RMP or the associated Evaluation and Recommended Determination. NMFS' proposed authorization of PFMC fisheries that are consistent with the management objectives specified in the 2003 RMP is thus subject to ESA section 9 take prohibitions.

## **I. Amount or Extent of Incidental Take**

The total exploitation rates in the 2003 PFMC salmon fisheries are expected to be similar to those considered in past opinions (NMFS 2003b). It is anticipated that the PFMC exploitation rate on most management units will range from 0 to 4 percent (see Table 2). However, since the co-managers consider the PFMC fisheries as interrelated with the Puget Sound salmon fisheries, the extent of the incidental take of listed Puget Sound chinook salmon will be the total exploitation rate, including those authorized through the PFMC process

For the purpose of this Incidental Take Statement, the extent of the incidental take of listed Puget Sound chinook salmon from fisheries, including those NMFS authorizes through the PFMC process, is at or below the total exploitation rates as modeled in FRAM model run 1603 or NMFS' rebuilding exploitation rates (Table 4). In the case of the Green and Nisqually Management Units, the authorized level of take is that number above their respective escapement goal. Allowable take is defined this way so as to be responsive to varying run sizes.

## **II. Effect of the Incidental Take**

In the accompanying biological opinion, NMFS determined that the level of anticipated incidental take of Puget Sound chinook salmon ESU in the proposed PFMC and Puget Sound fisheries is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

## **III. Reasonable and Prudent Measures**

There are two reasonable and prudent measures included in this incidental take statement for the ESUs considered in this opinion:

- (1) In-season management actions taken during the course of the fisheries shall be consistent with the level of incidental take established preseason that were analyzed in the accompanying biological opinion (see Table 4); and
- (2) Harvest impacts of listed salmon stocks shall be monitored using best available measures.

To clarify the first measure, NMFS expects that in-season management actions may be taken in 2003 that may be different than those anticipated pre-season. However, NMFS analyzed impacts to listed fish anticipated in 2003 against NMFS' rebuilding exploitation rates and concluded they were not likely to jeopardize the listed species. Therefore in-season management actions may be taken so long as they do not exceed the anticipated levels of take described in Table 4.

Table 4. Total exploitation rates based on the preliminary pre-season FRAM model run 1603, NMFS' rebuilding exploitation rate, or the 2003 RMP's escapement goal, by management unit, 2003.

Management Unit	Anticipated Total Exploitation Rate	NMFS derived' Rebuilding Exploitation Rate	2003 RMP's Escapement Goal <sup>1</sup>
Nooksack	20%		
Skagit Sum/Fall	50%		
Skagit Spring	24%		
Stillaguamish		24%	
Snohomish		24%	
Lake Wash. (Cedar River)	31%		
Green			5,800
White River	19%		
Puyallup	50%		
Nisqually			1,100
Skokomish	60%		
Mid-Hood Canal	29%		
Dungeness	23%		
Elwha	23%		

<sup>1</sup> Management units are managed by the co-managers for the specified escapement objectives (see Table 1).

#### IV. Terms and Conditions

The following terms and conditions apply only to NMFS' proposed authorization of PFMC fisheries that are consistent with the management objectives specified in the 2003 RMP. NMFS must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline required reporting/monitoring requirements in order to be exempt from the prohibitions of section 9 of the ESA.

These terms and conditions are non-discretionary.

(1a) NMFS, in cooperation with BIA and the USFWS, shall confer with the affected states and tribes, and the PFMC to ensure that in-season management actions taken during the course

of the fisheries are consistent with the 2003 RMP's management objectives established pre-season.

- (2a) NMFS, in cooperation with BIA, the USFWS, the affected states and tribes, and the PFMC, shall monitor the catch and implementation of other management measures at levels that are comparable to those used in recent years. The monitoring is to ensure full implementation of, and compliance with, management objectives specified in the 2003 RMP.
- (2b) NMFS, in cooperation with BIA, the USFWS, the affected states and tribes, and the PFMC, shall sample the fisheries for stock composition including the collection of coded-wire tags and other biological information to allow for a thorough post-season analysis of fishery impacts on listed species.

### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. NMFS believes the following conservation recommendations are consistent with these obligations, and therefore should be implemented by NMFS.

- (1) NMFS, in cooperation with BIA, the USFWS, the affected states and tribes should collaborate with the affected co-managers to evaluate available life cycle models or initiate the development of life cycle models where needed.
- (2) NMFS, in cooperation with BIA, the USFWS, the affected states and tribes, should evaluate where possible improvement in gear technologies and fishing techniques that reduces mortality of listed species.
- (3) NMFS, in cooperation with BIA, the USFWS, the affected states and tribes, should gather better information on ocean rearing and marine migration patterns to improve its understanding of the utilization and importance of these areas to the Puget Sound chinook salmon ESU.

### **RE-INITIATION OF CONSULTATION**

This concludes formal consultation on the NMFS, BIA, and USFWS subactions as they relate to the 2003 RMP and the Puget Sound chinook ESU. As provided in 50 CFR 402.16, re-initiation

of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, the federal agency must reinitiate consultation immediately.

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## **MAGNUSON-STEVENSON ACT ESSENTIAL FISH HABITAT CONSULTATION**

This is NMFS' Magnuson-Stevens Fishery Conservation and Management Act (MSA) consultation on its determination on the one-year RMP described in the above ESA section 7 consultation.

### **(A) Background**

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (Section 305 (b)(2));

NMFS must provide conservation recommendations for any Federal or State action that would adversely affect EFH (Section 305(b)(4)(A));

Federal agencies must provide a detailed response in writing to NMFS within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NMFS' EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (Section 305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA Section 3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NMFS is required regarding any Federal agency actions that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects on EFH.

### **(B) Identification of Essential Fish Habitat**

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: chinook salmon; and coho salmon; and Puget Sound pink salmon (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects on these species' EFH from the proposed action is based, in part, on this information.

### **(C) Proposed Action and Action Area**

The action area for this EFH consultation is the area defined by the 2003 RMP, Washington waters from the mouth of the Strait of Juan de Fuca at Cape Flattery, eastward. In addition, the action area for this consultation includes that portion of the EEZ off the coast of Washington, Oregon, and northern California.

The primary Federal subaction is NMFS proposes to issue a determination as to whether the 2003 RMP submitted by the co-managers meets the requirements of Limit 6 under the 4(d) Rule. NMFS is grouping three other proposed Federal subactions in this consultation because they are similar actions within a given geographical area. The duration of all of the proposed Federal subactions is through April 30, 2004. The following four proposed subactions are summarized here, but the Federal action is described in more detail in the above ESA section 7 consultation.

(1) The proposed NMFS determination as to whether a RMP meets the criteria in its 4(d) Rule. Management objectives specified in the 2003 RMP account for fisheries-related mortality throughout the migratory range of Puget Sound chinook salmon, from Oregon to Southeast Alaska.

(2) The proposed BIA funding of Puget Sound tribes' management, enforcement, and monitoring projects in support of the 2003 RMP. Only the funding of projects that may impact listed Puget Sound chinook salmon through April 30, 2004, are considered in this consultation.

(3) The proposed USFWS authorization of fisheries that are consistent with the implementation of the 2003 RMP, as approved under the 4(d) Rule. Only fisheries that may impact listed Puget Sound chinook salmon through April 30, 2004, are considered in this consultation.

(4) The proposed NMFS authorization of PFMC fisheries that are consistent with the management objectives specified in the 2003 RMP. The PFMC salmon fisheries occur within the EEZ off Washington, Oregon, and California. Only fisheries that may impact listed Puget Sound chinook salmon through April 30, 2004, are considered in this consultation.

#### **(D) Effects of the Proposed Action**

Possible fishery-related impacts on riparian vegetation and habitat would occur primarily through bank fishing, movement of boats and gear to the water, and other stream side usages. However, the resource management plan already includes actions to minimize these impacts, such as area closures. Also these effects would occur to some degree through implementation of fisheries other than those in the resource management plan. Construction activities directly related to salmon fisheries are limited to maintenance and repair of existing facilities (such as boat launches), and are not expected to result in any additional impacts on riparian habitats because of the fisheries in the resource management plan. The facilities used in association with the fisheries are essentially all in place. If there is a reduction in the salmon fishery program, some access points to the water might experience a reduction in traffic, but in most cases would continue to be used for other river activities, such as recreational boating. Therefore, the resource management plan fisheries would have a negligible impact on the physical environment.

Water quality might be adversely affected by the salmon fisheries as a result of the release of boat engine products, trash, and other effluents into the water. However, because fishing effort has been low in recent years due to sharply constrained fisheries, the impacts on water quality are expected to be negligible. The impacts of any fishery described in the resource management plan are also negligible given the geographic scope of the Puget Sound action area, impacts of the high levels of marine commercial traffic, and recreational boating activities unrelated to fisheries.

Another potential impact on water quality as it relates to salmon habitat is the impact of the presence of salmonid carcasses in the water, as a result of dying after spawning, or dying during unsuccessful upstream migration. The historical amounts of nutrients available to the ecosystem from these carcasses was large, and contributed to the enhancement of many forms of aquatic life, including the organisms juvenile salmon feed upon during rearing. However, because fisheries in recent years have been conducted at reduced levels, the loss in the contribution of nutrients from decaying carcasses and other fish wastes is reduced. In addition, fisheries are becoming increasingly targeted on hatchery fish that generally return to hatchery facilities, further reducing the impacts of fisheries on nutrient loading. Discussion and recommendations

on fishing activities related to this issue were included in the Essential Fish Habitat assessment conducted by the PFMC on Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). In general, salmon carcasses are important to salmon habitat, but the potential impact from carcasses on water quality in the action area is very minor.

As described above, the fisheries consistent with the implementation of the 2003 RMP would have a negligible impact on the physical environment. The anticipated impacts on water quality from the implementation of the resource management plan are also expected to be negligible.

### **(E) Conclusion**

For the reason discussed above, NMFS concludes that the proposed Federal action would not adversely affect designated EFH for chinook salmon.

### **(F) EFH Conservation Recommendation**

Pursuant to Section 305(b)(4)(A) of the MSA, NMFS is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. Because NMFS concludes that the proposed Federal action would not adversely affect the EFH, it will not issue conservation recommendations.

### **(G) Statutory Response Requirement**

Because there are no conservation recommendations, there are no statutory response requirements.

### **(H) Consultation Renewal**

The NMFS must reinitiate EFH consultation if the proposed actions are substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR Section 600.920(k)).

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